

APPENDIX C – SURFACE WATER MANAGEMENT PLAN

The Surface Water Management Plan (SWMP) outlines measures designed to mitigate the potential water and soils effects disclosed in Chapter III. The primary potential effects of increased mountain drainage are amplified soil erosion and transport. The SWMP outlines measures for short-term management of disturbed areas during construction activities as well long-term management of surface water drainage issues related to changes in land cover and usage.

The goals of drainage management for erosion and sediment control are:

- Minimize the amount and duration of disturbed soil areas.
- Prevent runoff from un-disturbed zones from flowing into disturbed zones.
- Reduce flow velocities of runoff through disturbed areas.
- Remove sediment from runoff before reaching streams.

This SWMP proposes measures applicable the Proposed Action. Because Alternative 3 either removes or reduces elements from the Proposed Action, the measures recommended are equally applicable to Alternative 3.

GENERAL CONSTRUCTION BMPS

- Physically identify and flag construction limits on the ground prior to construction.
- Avoid soil-disturbing actions during periods of heavy rain or wet soils. Apply travel restrictions during these time periods to protect soil and water.
- Trap sediment on-site to the fullest extent possible using straw bales, filter fence, and sand bags as soon as possible. Eliminate direct channel or indirect connection of disturbed areas from nearby drainages.

GRADING AND TERRAIN MODIFICATION

- Graded and re-contoured slopes should be feathered into existing contours and grade of off-slope terrain within tree islands and other areas. Minimize abrupt slope changes at trail-edge and/or distinct cut or fill slopes.
- Excess rock or soils debris must not be emplaced within tree islands or vegetated areas. Such material should be used as fill elsewhere in areas requiring it, or it will be disposed offsite.
- Heavy machinery should use existing routes for access to grading sites and not disturb vegetated areas.

DRAINAGE ROUTING

- Water bar spacing should generally be 75-100 feet; on steeper slopes a closer spaced interval of 50 feet may be necessary.
- Since forest vegetation, understory, and litter are sparse, dissipation of surface

flow energy by vegetation is minimal. Water bars should drain into armored, energy-dissipating infiltration basins of appropriate size wherever feasible. In places where topography and slope makes it practical, more than one water bar may drain into a basin of appropriate size.

- Water bars and drainage basins should be inspected seasonally, and should be maintained and cleared of sediment at regular intervals and as necessary.
- Two areas of extremely steep slope (greater than 50 percent) have been identified on the *Bonanza* and *Central Pacific* trails. Observations of drainage conditions (high concentrated runoff velocities creating incised rills) within similarly steep zones (on graded trails on the Mt. Rose side) indicate the potential need for more aggressive drainage management within these regions. The issue of concern is that the energy of high-velocity drainage within these zones is not dissipated sufficiently and creates a high erosion risk.

Prior to project implementation within these steep areas, it is recommended that Mt. Rose study the feasibility of implementing a system of drop-structures to collect drainage from water bars.¹ The system is essentially comprised of vertically oriented 36-inch drop inlets that collect drainage routed from water bars. The inlets would drain into an 18-inch corrugated metal pipe (CMP) that generally parallels the trail direction, routing water down slope toward areas of lower slope gradient where water may be discharged into energy-dissipating armored infiltration basins.

SLOPE STABILIZATION

- On steeper slopes, areas exposed by grading will require emplacement of jute-netting or other appropriate geo-textiles to further stabilize disturbed soils.
- Jute-netting or geo-textile stabilization should not occur in areas where Tahoe Draba is present or being re-established.
- In some areas of particularly irregular terrain, it may be impractical to adequately secure jute-netting to the terrain, allowing for water or wind to displace the underlying mulch. In these areas a tackifier, such as EarthBound® or similar product, should be utilized to hold seed and mulch in place and to maximize germination.

Jute-Net Installation

1. Seed and mulch the disturbed area.
2. Starting above the mulched and/or seeded area, bury the top end of the netting in a trench at least four inches deep and eight inches wide. The trench should be backfilled and tamped.
3. The netting should extend beyond the edge of the mulched and/or seeded area at least one foot on the sides and three feet on the top and bottom. Fasten with a row of staples one foot apart.

¹ Such a system has been implemented for several trails at Heavenly Valley.

4. Netting should not be rolled out along the contour.
5. Roll out the netting up and down the slope and secure with staples. Wire staples of No. 11 gauge or heavier should be used. The “U” shaped staples should be six to 10 inches long with a one inch crown. Use longer staples on loose or sandy soils.
6. Overlap the netting at least four inches on the sides and secure with staples five feet apart along the overlap.
7. Overlap lower end of uphill strip over downhill strip at least one foot and secure with staples one foot apart.
8. The netting should be cut around big rocks or tucked in around smaller ones to prevent bridging.

REVEGETATION

- General revegetation measures will not be employed in graded areas where Tahoe draba is present or being re-established.
- As specified in the mitigation section of Chapter II, Mt. Rose will work with the Forest Service to develop and appropriate seed mix based on the specific elevation of Mt. Rose, the existing habitat/vegetation, and recent seeding successes within the Mt. Rose area.
- Seeds should be distributed in such a manner as to maximize embedding within the soil. Broadcast methods, such as a Brillion® cultipacker or other appropriate mechanical or hand devices, help to ensure successful seeding.
- Planting/seed distribution should occur in the early spring or late fall.
- Revegetated areas should be fertilized with an appropriate soil-enhancing product, such as a Biosol® or another appropriate mix, at a rate approved by the Forest Service.
- Do not fertilize within 50 feet of wetlands or waterways.

REVEGETATION IRRIGATION

- The use of the proposed snowmaking infrastructure for summer vegetation irrigation will improve the growth, survival, and establishment of plant material during the first growing season. The climate of Lake Tahoe during the growing season is hot and dry. Little precipitation, if any, falls during the summer months. On most sites, the increased survival is well worth the additional costs of irrigation. The native and adapted species recommended for the Tahoe Basin may be irrigated for one or two years and then can survive without further irrigation.
- The frequency and quantity of irrigation is a function of species, site conditions, and precipitation. Deep watering is more effective than shallow watering and helps to conserve water supplies. Water should percolate at least two inches below the root zone during each watering. Thus, watering must be conducted as needed, and not restricted to specific quantities or schedules. Coordinate watering with weather predictions to avoid over watering, which may cause erosion.
- Irrigation water distribution may be conducted with either sprayers or drip-line

systems.

RIPARIAN CONSERVATION AREA

As detailed in Chapter III, proposed project elements would occur within identified RCAs. Approximately 3.9 acres of vegetation within riparian areas would be cleared or trimmed under Alternatives 2 and 3. In addition, seven lift towers and 0.2 acres of grading for construction of the East Bowl/Chutes Skiway and the Chutes Return Lift bottom terminal would occur in riparian areas under the two action alternatives.

The following section details specific project implementation requirements to meet the direction for established Riparian Conservation Objectives:

RCA Tree Clearing BMPs

- Wetland areas will be clearly marked and avoided during construction. Heavy equipment will be excluded from wetlands sites.
- Fell trees away from riparian areas.
- Tree clearing/trimming and removal will be done by hand or over-the-snow.
- Flush-cut trees without removing stumps or roots within wetlands and riparian areas.
- Any incidental resource damage associated with log skidding will be repaired.
- Follow all US Army Corps of Engineers (COE) guidelines as specified in COE Section 404 Permit²
 - Flush-cut trees; no grading or stump removal permitted
 - Where possible, unless trees present a safety hazard, tress should be left on the forest floor to contribute to coarse woody debris. Larger diameter trees can be removed since they may pose a safety hazard to skiers. Large branches may be trimmed off felled trees to allow for skiing with adequate snow cover.
- Move logs and logging debris by methods that minimize dragging or pushing through the soil to minimize soil disturbances.
- Conduct activities in such a manner as to avoid soil compaction and to maintain soil tilth.
- Do not dispose of logs or logging debris adjacent to streams or other water bodies.
- Maintain natural contour of the site and ensure that activities do not immediately or gradually convert wetland areas to a non-wetlands.
- Conduct activities with appropriate water management to minimize off-site water quality impacts. This includes using:
 - Silt fence, properly entrenched, installed up-gradient of disturbed soils to minimize introduction of off-site runoff into the wetlands area.
 - Silt fence, properly entrenched, installed down-gradient of the disturbed soils to minimize potential sediment introduction into connected wetlands

² #COW-199875119-USACE

areas.

- Trees will be cut into lengths that can be removed from the site by hand or other non-obtrusive methods. Tractors, skidders or other similar vehicles will not be allowed within wetland areas.

Riparian and Wetland General Construction BMPs

- Prior to disturbing any intermittent drainages and wetland vegetation, any flow in the drainages will be diverted around the site in flexible pipe. Once the site is dry, construction may commence.
- Silt fences should be installed below drainage crossings to prevent sediment movement offsite. The fencing will be placed perpendicular to the drainage, extending 25 feet on either side of the channel.
- Disturbed areas should be mulched and fertilized, utilizing certified weed-free seed mix and mulch. Re-vegetation should commence within five days of completion of ground disturbing activities.
- Where slopes are steep and/or risk of slumping or sloughing exists, re-seeded areas should be additionally stabilized using fiber netting, geotextile fabric, or other stabilization mesh.
- Mt. Rose staff should complete site inspections at least once every two weeks and following any significant precipitation event to ascertain that temporary BMPs are being followed, that they are performing effectively, and that re-stabilization and revegetation efforts are proceeding satisfactorily.

Implementation of the specific RCA-protection BMPs cannot completely guarantee that some resource loss would not occur; however, their diligent application should ensure that construction of specific project components proposed within these resource areas would occur in a manner that would maximize the proposal's agreement with stated Forest Plan objectives. With careful implementation of these riparian construction BMPs, the components within the current proposal would comply with Forest Plan management objectives and offer consistency with the directives outlined in the Amended Forest Plan.